August 1991

Open Systems

What IBM is doing to help your people and computer systems work better together

Why Are Open Systems important?

Information has become as critical to most organizations today as land, machines and labor were to the Industrial Revolution of the 1880s.

With quality and timeliness joining cost control as key factors in competitiveness, information has become essential to the success of a process – or a business. "The center of gravity has shifted to the knowledge worker," in the words of Peter Drucker.

To support this changing business climate, the way information systems (I/S) decisions are made is changing.

Time was, the mainframe sat in its glass house, tended by computer experts, and was the only information processing resource for the entire business. With the advent of the personal computer, the I/S world changed. Functional management or key knowledge workers took charge of their own destiny. Individual PCs, bought to meet the needs of a particular individual or department, expanded into local area networks. LANs grew into "islands of information" within an enterprise – each often speaking a different language of operating systems, communication protocols and the like.

Today, corporate mergers demand that differing I/S operations combine functions, along with hardware and software from different vendors. Within a company, consolidating divisional installations into an enterprise-wide system might force management to knit the existing array of multivendor equipment into an integrated whole.

To prevent chaos, the enterprise needs a flexible information system that will support its business goals – not just a glass house, but an infrastructure of standards and architectures that will enable smooth information flow, across and among enterprises.

Open Systems make it possible to liberate information so more of your people can use it more easily ...for the right information to flow to where decisions must be made...to widen communications with customers and suppliers...for the information system to match the business process that meets the business purpose.

IBM

Comprehensive set of international information technology standards . . .

What's an Open System?

Our customers make it very clear to us that the future of their business depends on networks that communicate "any-to-any, end-to-end."

They mean that their employees must be able to reach out easily – across the enterprise and beyond – for the information they need, wherever it resides, no matter who made the equipment necessary to make that happen.

When asked for more, they tell us they want to be able to:

- Protect their existing investment in skills, applications, software and hardware, but still get the benefit of new technology as it comes along.
- Buy the latest, best new hardware and software from any vendor, and have it work smoothly with their installed systems and applications.
- Install and manage the resources of their I/S network in a multivendor, and possibly, a global environment so that it can grow without disruption as needs change.

In December 1990, the IEEE Committee on Open Systems crystallized the customer point of view with this definition:

> Open Systems environment: A comprehensive set of international information technology standards and functional standards profiles that specify interfaces, services and supporting formats to accomplish interoperability and portability of applications, data and people.

Portability among systems from multiple vendors means that people skills, as well as data and application programs, new and old, can be moved from one computer system to another. Along with investment protection, portability gives customers the freedom to choose products from vendors on the basis of innovation as well as cost, quality, service and support.

Interoperability means that the customer's various computer systems, even from multiple vendors, must work together to solve business requirements. This way, departments using systems that suit them best can be connected, so that necessary information can flow to the executives, managers and professionals who need it. And data can be accessed wherever it is, regardless of its location, source or format.

Customers might add to the IEEE definition that they want all this to happen smoothly, in a way that is transparent to the person sitting at the workplace.

Standards

For this vision to become reality, adherence to standards is the necessary condition for any vendor's products to be useful components within an Open System. And there are many forums where companies, even competitors, are sharing ideas and working together to meet customer needs.

Developing new standards to meet those changing business needs is a continuous process that can take years, involving development, implementation and then conformance/interoperability testing.

IBM is approaching all information technology standards with an "open" mind

The organizations involved may be formal development organizations (such as ANSI, ISO), government agencies (NIST), technology implementation associations (OSF™) and interface definition and testing groups (X/Open, COS, OSINET).

Sometimes an architecture or product from a single vendor or organization gains such widespread acceptance that it becomes a de facto standard.

Examples: Digital Equipment Corporation's DECnet®, IBM's Systems Network Architecture (SNA) and the Transmission Control Protocol/Internet Protocol (TCP/IP).

IBM is approaching all information technology standards with an "open" mind:

- If a widely accepted industry standard exists, we will actively support it.
- While a standard is emerging, we will participate in its development so customers' investment in any underlying IBM technology can be protected.
- Where no standard exists, and IBM technology provides customer value, we will seek ways to provide access to that technology in a heterogeneous environment.

As for our level of commitment, there are more than1100 IBM management and technical people worldwide taking part in the work being done by a spectrum of some 1200 standards activities. For example, we participate in many national and ISO chartered activities worldwide, are a partner in many joint development groups such as OSF and are a member of X/Open, COS, SPAG and OSINET.

Getting Down To Details

IBM's two major operating system environments – The Advanced Interactive Executive (AIX®) and Systems Application Architecture® (SAA™) – are committed to Open Systems through standards support.

IBM's commitment to the UNIX® operating environment began with the introduction of AIX in the mid-1980s, which is exemplified now in the RISC System/6000® family and also runs on the PS/2® and System/370-390.

AIX Version 3.0 conforms to existing published international standards, de facto standards and supports Network File System (NFS™), X Windows™, OSF/Motif™, OSI, TCP/IP, SNA and other networking protocols.

SAA was developed as a framework to establish common programming interfaces, common communications support and common user interfaces for four IBM operating systems: MVS, VM, OS/400® and OS/2® EE.

SAA supports and implements international standards such as Open Systems Interconnection (OSI) and common languages such as C, COBOL and FORTRAN. SAA's open interfaces are used by many manufacturers, software vendors and business partners in the specification and definitions of their products.

Growing interoperability between AIX and SAA protects our customer's investment and serves to build bridges to non-IBM

". . . a willingness to create solutions that meet business needs . . .

systems. This interoperability provides the basis for Open Systems that embrace personal computers, workstations, mid-range systems and mainframe computers from IBM and other vendors.

Open Software Foundation (OSF) products will provide some of the leading edge technology, based on a vendor neutral, broadly based consensus.

IBM is committed to providing support for selected components of the OSF Distributed Computing Environment (DCE) on both AIX and SAA. We have made substantial contributions of software technology to the OSF/1™ operating system. We are also providing the systems integration services for the forthcoming DCE product and are participating in submissions to the Distributed Management Environment's (DME) Request for Technology (RFT). In return, we will incorporate OSF technology into both our AIX and SAA products.

IBM's experience and familiarity with standards in the workplace make possible its wide array of services offerings: Multivendor Client Services and Maintenance, Systems Operations, Network Custom Services, Multivendor End User Support and Professional Services to name just a few. Still more are being developed in partnership with customers to meet emerging business needs.

IBM's Commitment

"When I meet with groups of IBM customers these days, I talk about a new spirit in the company, a dedication to openness in meeting their needs...an attitude, a willingness to create solutions that meet business needs, regardless of the specific computing environment."

George H. Conrades, IBM senior vice president and general manager, IBM US, is speaking out on the company's position. He continues:

"The question of multivendor systems is sometimes not a question at all. We know that IBM, on its own, cannot satisfy every customer's requirements. But we can work with any customer to build the best solution, to find that ideal combination of hardware, software and services."

C. Michael Armstrong, IBM senior vice president, put it this way at the UniForum Conference in Dallas, Texas:

"Open Systems is the future, and IBM's future is in open systems. Not only have we made open systems IBM's strategy, we have made it a promise. We intend to be the open systems vendor of choice in the 1990s."

IBM's Open Systems Strategy

In practical terms, IBM will build or migrate its products to meet standards, license functions from other sources to incorporate in our products, offer IBM technology to the standards community or license it to other vendors as appropriate.

Both the AIX and SAA environments are already rich in incorporation and use of established and emerging industry standards. That participation will, of course, continue.

. . . support OSI, TCP/IP, SNA and other networking protocols

While standards are essential in facilitating Open Systems in general, customers need certain specific functions, among them:

- Multivendor networking
- Transparent access to data
- Consistent user interface
- Platform flexibility
- Systems management

Here's how IBM is responding:

- **Multivendor networking –** cross-vendor communications capabilities that facilitate information exchange from the desktop to the mainframe.

IBM believes customer networks will be composed of OSI, TCP/IP, SNA and other networking protocols coexisting in a heterogeneous state and have broad connectivity and management offerings for IBM and non-IBM networks.

We support Ethernet®, Manufacturing Automation Protocol (MAP), Token Ring and Fiber Distributed Data Interface (FDDI) for local area networks, and have recently agreed to market, service and support Novell's NetWare® LAN solutions. We support TCP/IP, the widely accepted de facto standard, across both the AIX and SAA platforms. IBM supports OSI, the accepted international standard for multivendor networking systems, providing OSI capabilities on AIX for the RISC System/6000 and all SAA platforms. IBM continues to enhance SNA through support of international standards, published interface extensions and submission of key interfaces and protocols to standards bodies.

- **Transparent access to data –** to be able to access relational (data base) or file data wherever it is, no matter how it was created.

IBM's relational data base capability is based on an interface called Structured Query Language (SQL), an ANSI and Federal Information Processing Standard (FIPS) standard. Our SQL/DS® is the first relational data base to pass the FIPS compliance test. Our DB2 product is committed to those same standards.

In 1990, IBM announced the first heterogeneous architecture for distributing data across systems (DRDA™). With it, customers can retrieve and update local and remote data using SQL. DRDA will be the basis for AIX and SAA data base management interoperability. The architecture has been published, and workshops for vendors are showing them how to adapt DRDA to their products.

IBM also provides multiple ways of accessing and transferring files (non-relational data) across the network. They include: Network File System (NFS), implemented on AIX systems and most SAA systems; OSI's File Transfer and Access Management (FTAM) for interface on MVS, VM, OS/400, OS/2 EE and the RISC System/6000, along with Distributed Data Management (DDM) for access among MVS/CICS, OS/400, OS/2 and PC-DOS systems.

- **Consistent user interface –** a convenient, easy-to-use graphical display with interaction attributes that are consistent across end-user terminals, PCs and workstations.

Customers are also asking for client/ server capability

IBM's Common User Access (CUA), first introduced with SAA in 1987, is implemented in OS/2 Presentation Manager. CUA's increased focus on the graphical interface has significantly influenced OSF/Motif™. Today, the OSF/Motif Application Toolkit is available in the AIX environment for both the PS/2 and RISC System/6000 systems, as well as being provided as part of the TCP/IP product for MVS and VM. CUA is also supported by Windows 3.0® from Microsoft Corp.

- **Platform flexibility –** a way to develop applications that is consistent across platforms and allows those applications to be executed across a variety of platforms.

IBM's AIX Family provides UNIX users with that environment's full, standards capability across a wide range of computing systems.

Similarly, SAA provides application developers with consistent programming interfaces such as SQL, C, COBOL and FORTRAN, many of them based on open standards. Those developed by IBM are offered to the industry through published reference manuals and licensing agreements.

- **Systems management –** the ability to manage the total information system resource, across all vendor platforms, from a single point.

SystemView is IBM's strategy for planning, coordinating and operating heterogeneous, enterprise-wide information systems. SystemView established the structure for management of all multivendor information resources, including host, network, data base, storage and business administration. IBM's NetView®, based on our Open Network Management architectures, is the SystemView network management and automation platform for the System/390. Through the Open Network Management architectures, open product interfaces and support of industry standard management protocols – including OSI CMIS and the TCP/IP Simple Network Management Protocol (SNMP) – NetView and associated business partners offer extensive capability to manage multivendor voice and data networks. The offerings allow flexibility to manage at both distributed points of control and centrally from a single NetView graphics workstation.

In the area of LAN management, IBM and 3COM developed an OSI-based standard for management of heterogeneous LANs, which later became the IEEE 802.1B LAN Management standard. This standard provides an open base for IBM and other vendors to provide cohesive LAN management for multivendor products across both Token Ring and Ethernet environments. The IBM LAN Network Manager and LAN Station Manager are the first IBM implementations of this emerging standard.

In addition to the above items, many customers are also asking for **client/server** capability, which allows users with authorization to access applications and data in the enterprise from any workstation. An Open System is fundamental to **client/server**, and we are providing the infrastructure capabilities to support this important environment.

For one example, IBM's Advanced Program-to-Program Communication (APPC) protocol provides access to SNA services allowing communication on a peer-to-peer basis. Additionally, we provide the SAA Common Programming Interface for Communications (CPI-C) for high-level access to APPC/LU6.2 applications. APPC, a key IBM client/server offering, has been licensed by over 40 vendors, including DEC, NCR, SUN and UNISYS.

Looking Ahead

We're measuring everything against a yardstick of openness

No company, on its own, can satisfy every customer's requirements. But IBM has the skills and experience to work with any customer to build for them the best solution possible, to put together the ideal combination of hardware, software and services available anywhere in the industry to get the job done.

In recent months, IBM has announced a number of alliances – with Novell, with Apple, with Wang, with Hewlett Packard, with AT&T, among others – that involve sharing technology and mutual interests. These alliances support IBM's long-term strategy for Open Systems, and they won't be the last.

At IBM, we're measuring everything we do – from the desktop on up – against a yardstick of openness. It's what we have to do because it's what you want us to do. Give us a call.

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